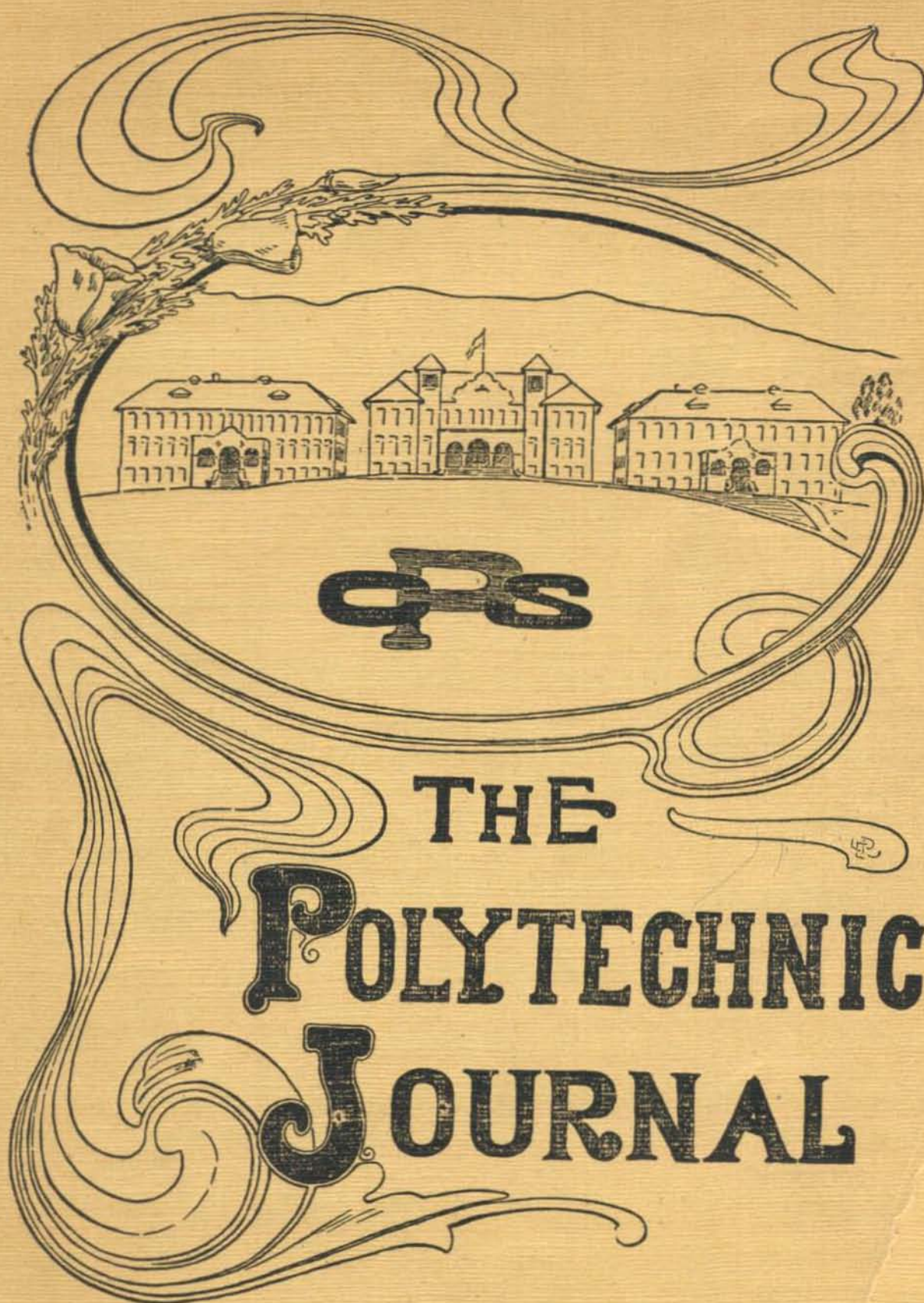


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The Polytechnic Journal

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FORWARD

The management of the Journal has kindly extended the courtesy of its pages this month to the instructing staff, who are presenting to the public the various lines of work in which each instructor is engaged.

It will be noted that this work is largely of an industrial nature. Education and training in the industries has become a well established thing in some schools in every state. The growth of this kind of education is a matter of less than half a century. It may be said to have had its real beginning in the United States in the establishment of the Land Grant Colleges, which have been established in every state through the provisions of the Morrill act, passed by congress in 1862. The special object of those institutions was to give instruction in agriculture, mechanical arts and military science, but not to the exclusion of any essential literary or scientific subjects. The success of industrial education in these colleges led to the establishment of manual training in large cities and commercial centers in schools of secondary grade. Following the large and immediate development of industrial education along the lines of mechanics came much later the introduction of agriculture into secondary schools, and still later into primary schools under the name of nature studies. Instruction in household arts has been planted in nearly every Land Grant college and likewise in all

of the manual training schools in cities.

Inasmuch as agriculture concerns one of the chief and in fact the foundation industry of the country, training therein should be classified as industrial education. The report of the secretary of agriculture for 1906 places the farm products of the year at the immense valuation of \$6,794,000,000. Notwithstanding this immense production, prices of farm products are universally higher, in keeping with the advance in prices of other commodities, and farmers are urged to largely increase and also to improve the quality of their production.

In California, for instance, the production of butter is larger than ever before. The total for the year ending September 30, 1906, is placed by the state dairy bureau at 44,044,578 pounds. In the face of this large production the prices for butter have in the last few months reached highest mark known in many years. At the same time there has been an impression that the quality of the product has not improved.

The problem of the American farmer is to better the quality of his production, thereby securing a better demand at an increased price. This is equally as essential as striving to increase the production. Aside from the areas that are being opened for habitation by the reclamation services, the arable area of our country is quite fully taken up. The increase of production to meet the

growing needs of the country must, therefore, come largely from an increase per animal and per acre, rather than a largely increased productive area. Agriculture has therefore become more intensive and the farmer must accordingly become more of an educated man.

While not losing sight of the value in training in mechanics and household arts, the advantages of which are as familiar to me as they can be to any one, still the attention of the public should be called very closely to the advantages of agricultural education, which are being offered by various institutions. The Polytechnic School has a farm of 280 acres, to which it hopes to add, through the provision of the legislature, some 30 acres more of excellent land. It is being stocked with horses, cattle, swine and poultry in as goodly numbers and of as good quality as our limited means allow. Its laboratories and shops are equipped with the appa-

tus and materials which are being found to be most useful in giving the essentials of instruction in the various lines which should be understood by any well trained farmer.

Its course of study is modelled somewhat after that of the Land Grant colleges, although it is a school of secondary grade and admits graduates from the grammar schools. Its aim in agriculture is to train young men who are to go out as tillers of their own soil to build homes of their own upon sound bases, such as can be secured only through a well trained mind.

I trust that those to whom this copy of the Polytechnic Journal may come will read carefully the description of our work given by the various instructors, and we shall gladly enter into correspondence with any to whom these pages may have been of more than passing interest.

Leroy Anderson, Director.

Department of Chemistry, Agriculture and Veterinary Science

As chemistry is the science on which the art of agriculture rests, an attempt is made early in the course in agriculture to acquaint the student with the elements of this subject.

In the first year of its course, under the head of soils and fertilizers the student acquires an elementary knowledge of the origin of soils, their physical and chemical properties, and the influence of these on plant growth. The conditions and agents that modify these properties are discussed under such headings as influence of organic matter on the soil; effect of lime on clay soil (a) as a modifier of the physical properties, (b) as a liberator of plant food. Numerous topics of this character are treated until the student has a good

working knowledge of the subject.

In laboratory and field the subject of rocks and their minerals as related to agriculture receives attention. At the same time the relation of types of soil to the native vegetation is pointed out.

Methods by which tough plant food is rendered available, such as green manuring, cultivation, etc., are dwelt upon and the changes continually taking place in the soil, such as nitification and similar processes. The renovation of worn-out soils by rotation of crops, growing of cover crops, dairy farming, etc., are discussed, while alkaline soils cause, detection, crops tolerant of and remedies for such soils are topics of importance.

Under fertilizers barnyard manures

are discussed. As to composition and conditions that modify the composition as character of food used, exposure, etc., best methods of handling these manures to prevent loss of plant food and various other topics relating to the subject.

Chemical manures or commercial fertilizers are discussed under topics, composition, methods of preparation, commercial and agricultural values and methods of ascertaining agricultural values on individual farms. Under commercial value the methods used determining the same are taken up, that the farmer may determine for himself whether he is paying an excessive price for these goods or not.

I may say here that farm arithmetic forms an important feature of all work in this department. These problems are numerous and varied and touch all phases of farm life.

In the second year of his course the student in agriculture is required to devote ten hours per week to general chemistry and its relations to agriculture. This instruction is given by lectures, and laboratory practice.

THE CARE OF ANIMALS IN HEALTH AND DISEASE.

The farmer's revenue from domestic animals is oftentimes seriously curtailed by losses and diminished usefulness

arising from the lack of intelligent care and treatment.

The course in agriculture of this school aims to give such knowledge of animal physiology, anatomy and the treatment of simple diseases of animals as shall enable the young farmer to protect himself against the losses arising from the causes mentioned.

Five hours per week during two terms of the third year are given to this work and is devoted to the discussion of topics of practical interest to the farmer and stock raiser.

The California Polytechnic School is the only institution in the state giving systematic instruction in poultry farming.

The facilities offered for practical training are excellent. A well equipped poultry plant with all the modern conveniences for raising poultry is at the disposal of the students.

He becomes familiar with approved methods of hatching, brooding and rearing young chickens, the scientific feeding of farm poultry and the economical housing of the same under California conditions, the study of breeds and compounding of rations. The estimation of cost of establishing poultry plants gives the student a knowledge of the subject which if he should engage in poultry raising will save him many costly mistakes.

S. S. Twombly.



Department of Plant Industry and Irrigation.

For some time passed, the agricultural press has had a good deal to say about agricultural education. Both the city and the country newspapers have been discussing the matter pro and con, but always in a very general way. When we get down to the real business of teaching agriculture, we find that we must consider the several sciences of which agriculture is composed, the sum total of which go to make up what we call agriculture. The following is an enumeration and description of some of these as taught in the department of plant industry and irrigation in the California Polytechnic School.

BOTANY.

The object of the botany course is to give the student a general survey of the plant kingdom and at the same time get a thorough knowledge of those plants that have horticultural and economic value; a branch of botany that receives special attention is Bacteriology. The student is taught that not all "germs" are bad, that the bacteria cause the bread to rise, the cream and cheese to ripen, and the fruit juices to turn to vinegar; that it is they which gather that subtle gas nitrogen from the air while they are living on the roots of certain plants, and "fix" the nitrogen in such form that it is stored ready for the use of other plants. But there are some bacteria which cause infectious disease, and the most common of these are studied for detection and control. The compound microscope and its workings are learned in this connection.

During the spring a large variety of plants are available in the fields and some of the important families are treated both as to relationships and to

minute structure. Special attention is given to food and fibre plants.

Plant Ecology includes the relation of plants to one another and to the locality in which they grow, pollination by wind and insects, competition for mastery of a locality, plant societies, and observation of plant adjustment to environment.

Weeds are common as dirt. They exert right of eminent domain along fence rows, roadsides and over stretches of waste land. The Rocky mountain district has the corn cockle, the middle west the sunflower and tumble weed, the northwest and Washington the Russian thistle. Prickly lettuce and cockle bur are almost universal. A single plant may have thousands of seeds to be blown far and wide or carried by jute bag and freight car, the sheep's wool and the cow's tail. A simple remedy is never to let the plants go to seed, to destroy the plants when young and small.

The principles of forestry, economic value, planting, care and diseases of forests are given a place in the course. Field excursions are made from time to time through the year to see the plants in their haunts and to note the season and nature of growth.

HORTICULTURE.

In California, by horticulture is meant Pomology, or the growing of fruits. Horticulture in California is more important, complex and varied than in any other state. The great principles of propagation and handling of fruits are universal but the conditions and variations of California soil, climate and moisture often make their application occult and far to seek. Latitude is not a factor in our horticulture.

Oranges grow equally well in Riverside, Southern California and in Oroville, five hundred miles north. Soils may change completely in a mile or the same soil may be duplicated many times in the state. Climate may be radically modified by a jutting hill, near the coast, while in the interior valleys the length of a large county may not make a perceptible difference in either temperature or precipitation. The kind and variety of fruit will determine success or failure. The peach is grown successfully in more than a dozen counties, commercial date growing is limited to a few favored areas. It is the purpose of the work to give the student such a training in principles as applied to this state that he will not later spend years in learning from that dear teacher, experience, what is already known.

But horticulture cannot be learned from text book and lecture alone. There must be frequent and continued use of the instrument of the art. The budding and grafting knife, pruning shear, microscope, mixing tank and spray pump must be the constant companions of the budding horticulturist. Each of the operations is demonstrated in the laboratory, followed by excursions to the school nursery and orchard, where each student performs the operation himself.

GARDENING AND PROPAGATION.

All entering students in agriculture take the course in gardening and propagation. The purpose is to have vegetables for the table the year round. Most farms are supplied with stale vegetables of inferior quality by a peddler who calls at irregular intervals, when soil and climate lend themselves to the production of a superior table article on the farm with a little care. Home production is illustrated and encouraged. Irrigation is supplied by the school

water system. A storage tank and flume connection with the barns illustrates the value of cow stable washings. The experiment of irrigating a row of celery with washings and others with hydrant water showed a marked increase in succulence and size for the row treated with "washings." Each gardener has a plot of his own which he plants, plans and tends. There is a good natural rivalry to see who can make the finest garden.

The green house is an indispensable adjunct to the propagation practice. Here rose, carnation, begonia, sea grape and other stem and leaf cuttings are made and grown. Here also the less hardy plants are grown for illustration, and the students practice mixing of soils, potting and handling of plants.

IRRIGATION.

In the senior year the student enters the course in irrigation, where he learns to measure water in pipes under pressure, and in open channels; to construct canals, ditches and flumes, and to prepare land for irrigation. Methods of application must be adapted to the locality, and to the nature and abundance of the supply, from the small plow furrow of Orange county to the great flooding system of the interior valleys. It may even be desirable to irrigate alfalfa with furrows, as is done in Yakima Valley, Washington. More attention must in future be given by the irrigator to the effect of water on the mechanical condition of the soil, and upon the chemical changes which follow. Most of the alkali farms in the irrigated country are due to excessive irrigation on higher ground adjoining. Irrigation hardpan is sure to follow improper tillage and use of water. With all that has been said and done we are far from getting the best use of water.

J. E. Roadhouse.

Department of English and History

Since the amount of time devoted to English, two years, is considerably shorter than that allotted to the same subject in the usual high school course, the essentials of a practical course are constantly kept uppermost in mind. The fundamental aims of the instruction in English are:

1. To enable the student to speak and write with clearness and directness.
2. To acquaint him at first hand with some of the best books of English and American authors.
3. To build up a correct and increasing vocabulary.
4. To teach the use of a library.

Oral composition has a prominent place along with written composition.

Books for reading and study are as a rule selected from the list required for college entrance, including such titles as *The Alhambra*, Irving's *Sketch Book*, *Ivanhoe*, *Silas Marner*, *Merchant of Venice*, and others.

Third-year "history" is American history only. Civil government and the simple elements of political economy are included in the year's work. The instruction in American history aims to show how the present grew out of the past, attempting to give the student a basis on which he may do further intelligent reading and study of the subject. The study of industrial development holds an important place with political development. The instruction in civil government covers the organization of the federal government with special attention to California state and local governments.

The closing weeks of the third year course in history are devoted to study of the simple elements of economics. The meaning of the terms wealth, capital, value, wages, etc., are discussed. The functions of money and credit are studied, also the significance of the terms free trade, protection, etc., the aim being to bring out the meaning and significance of some of the more common features of national housekeeping.

The proposed extension of our Polytechnic courses from three to four years is heartily indorsed by this department. In addition to greater thoroughness in all of the technical departments, the change will allow a full year for the study of American government and economics, two of the most essential branches of knowledge in the development of intelligent American citizenship.

Valuable additions to the school library now furnish the student with excellent reference facilities, and further addition will be made as our needs require. A set of maps showing the growth of United States territory, and a cabinet case of eight splendid wall maps have just been added to our equipment. Our stereopticon is one of the most pleasing and profitable pieces of our equipment. The history department has begun the collection of several sets of lantern slides illustrating pictorial places of America. These illustrated lectures on various phases of American history are to be given this winter term for the first time, and will continue to be an established feature of the course in history.

LeRoy B. Smith.



Animal and Dairy Husbandry

"Well, what is there to teach about animal and dairy husbandry?" Such is not an uncommon remark from persons when they first hear about the animal husbandry and dairy department. And no wonder, for people in the west have never turned their attention very seriously to agriculture—except what they term "practical agriculture"—and have rather tabooed anything that looked like "book-learnin'" in this direction.

But there are many things to be taught along these lines—things which man must know before he can succeed in the work, and things which if learned at school will save years of apprenticeship and perhaps many expensive experiments.

It is some of these things, then, that we undertake to study and teach at the California Polytechnic School. Along animal husbandry lines there are stock judging, study of types and breeds, principles of breeding, live stock management and animal nutrition, all of them important for the successful stock-man to understand.

In both the judging work and the study of types and breeds, all the different classes and breeds of animals are studied. The demands of the market, the animal form that comes nearest filling that demand, and the breeds of animals that come nearest conforming to that ideal, are given the most careful consideration. The history, characteristics, and peculiar adaptability of the different breeds of live stock are studied. This work of course cannot be done with texts or lectures alone, and as great a variety of stock as possible is kept on the school ranch. Already we have something of a collection of horses, cattle and swine, and more and better stock is being procured as our means permit. These animals are used

as examples in class room work, their faults and perfections pointed out, and ways of improvement suggested.

The work is made entirely practical, not mere theories in regard to improvement advanced, but things which have "proven out" at our experiment stations and in the hands of practical men, things which it means money in a man's pocket to know.

The students have shown a lively interest in these courses, and at the present time some of the third year men are carrying on experiments at the dairy-barn on their own account to determine economic methods of feeding dairy cattle and on cost of milk production.

Instruction along dairy lines is older and consequently better understood, but none the less needed than in animal husbandry. It is our aim here to give instruction that will not only aid and benefit the man who runs the small dairy, but the creamery operator as well. All the lines of work from milk production to the finished dairy products are taken up and studied, including selection, care and management of dairy cattle. Dairy sanitation, production of market and certified milk, milk testing, separation of cream and manufacture of butter and cheese, are all given their due share of attention. They are studied not only from the standpoint of the small producer, but of the wholesale dealer or creamery operator as well. A study of dairy machinery is also included, and our work along this line has been greatly facilitated by some of the dealers in such wares kindly donating or loaning us some of their machines. We have a small creamery fitted up in the basement of the main building, and here laboratory work is carried on fairly satisfactorily, and at certain seasons of the year the creamery is operated regularly in the same

manner as larger plants are run.

The classes in this department have been growing constantly and a great deal of interest is manifested. A course for the girls has been instituted the past year and some of the halls heretofore sacred to the masculine contingent have been graced by the presence of the gentler sex. In this course especial stress has been laid upon milk testing, both the Babcock test for fat and various tests for adulterations, and upon

the many food stuffs manufactured from dairy products.

Altogether, though the work in these departments is merely in its infancy, we feel that we are making some progress and doing some good. An effort is made all along to make the work thoroughly practical. Theories studied in the class room are worked out in the laboratory and "science with practice" is kept in mind all the time.

C. W. Rubel.

Physics and Electrical Courses

There is no branch of school work more enjoyed by the student who is well prepared or more disliked by one who has slighted his former work than the subject of physics. Arithmetic, algebra, geometry, trigonometry and chemistry all stand as ground work for physics and a man unprepared in these branches soon decides himself a failure as a physics student. The subject also requires a liberal allowance of clear logic and "horse-sense." Furnishing such excellent mental gymnastics and being a practical application of so many previous subjects, physics is considered one of the most important divisions of school work, and is required in all high school courses and in most private institutions.

Our work in physics is similar in many ways to the ordinary high school course. We find it advantageous to take up the subject earlier than is usually done in order to get the preparation for the more advanced electrical and mechanical work followed later.

A fairly well equipped laboratory strengthens the course. Among recent acquisitions may be mentioned a Ruhmkorff induction coil giving a six inch spark, complete X ray apparatus, a good set of Geissler tubes, spectroscope, electric photometer, electric meters,

various testing instruments, dark rooms, etc., etc.

From time to time we plan to add a greater variety of apparatus and to give a strong and specially attractive course in this subject of such great inherent interest.

California's development along electrical lines has been wonderfully rapid during the last ten years and specially marked since the successful operation of high voltage transmission lines has made possible the economical use of Sierra Nevada power in all parts of the state. There is every prospect that the next ten years will see the electrical industries taking even greater strides as more perfect apparatus is developed and the public becomes fully awake to the advantages of electrical power for a variety of purposes too numerous to mention.

The development of such an industry requires an army of men of varying degrees of technical skill. Positions of great engineering importance are held by men of the highest technical ability, the basis of whose training is usually a university education. Only a limited number of such men are required.

A far greater number of young men find good employment in the secondary

positions such as power house foremen, dynamo and engine tenders, switch board operators, general wire men, and as line construction and repair men. In any of these positions a man will do better and more intelligent work if he understands the principles of electrical action and has had practical experience in the handling of electrical machinery.

It is the aim of the course in electrical practice to fit men for these positions, any of which furnish an industrious and studious man ample opportunity to climb higher in his profession. The demand for this class of men is great as is also the number of men desiring to prepare for such work. One who has not the time or preparation necessary for a university training may fit himself in a few years to be out earning his way in a trade that is well paid besides having possibilities of great advancement. With this situation in mind the following electrical work has been laid out.

The important principles of applied electricity are taken up in a class room course dealing with electrical laws and action, the construction and operation of the common types of electrical machinery, general wiring, line construction, etc. This work is supplemented by a laboratory course giving excellent practice in operating and testing a variety of electrical machines and apparatus. A considerable amount of wiring is done. Recently the students ran a six hundred foot branch line to the carpentry shop, set up a two horse power motor, and connected it to a buzz saw, doing a neat and substantial job throughout.

The laboratory is equipped with a limited amount of high grade apparatus including direct and alternating

current generators and motors, rotary converter, transformers, arc lamps, electrical instruments, etc. Work is given along the same lines dealing with engines and boilers. The steam heating and lighting plant of the school is handled by the students during laboratory hours. They take indicator cards and practice valve setting besides attending to the ordinary duties of operating the plant.

At present our laboratory equipment is too limited to accommodate properly more than a few students but from time to time we hope to install additional apparatus that will increase our capacity and range of work. Our greatest lack is a machine shop. The facilities that such a shop would offer for building and repairing all kinds of machinery would greatly strengthen our mechanical course.

The library has many volumes of standard electrical and mechanical reference which the students find of great assistance in their advanced work.

The young men attending this school are largely self-supporting hustlers, who mean business in all their school work and as such deserve every advantage the state of California can offer. Considering the demand for skilled mechanics of this class and the great number of young men anxious to fit themselves for the work, we are confident the state will deal generously with our needs and at an early date will furnish a liberal equipment of substantial buildings, and up to date machinery and apparatus, with the result that California Polytechnic mechanics will be known throughout the state and everywhere will command a premium.

H. B. Waters.

Mathematics

At present the course in Mathematics includes Arithmetic, Elementary Algebra, Plane Geometry, Plane Trigonometry and Advanced Algebra.

The first year is devoted to the study of Arithmetic and Elementary Algebra. This year we have two classes. One being composed of Agriculture and Domestic Science students, the other of Mechanics. The former class have four lessons per week in Algebra and one in Arithmetic. The latter class have five lessons per week in Algebra and two periods per week for one term in Arithmetic. In Algebra each class is expected to complete the work through gradatic quadratic equations. This includes fundamental operations, special rules of multiplication and division, common divisions and multiples, the transformation of fractions, simultaneous equations of the first degree, the theory of exponents and quadratic equations. Much emphasis is placed upon the methods of factoring, and the solution of equations. Facility and accuracy in the manipulation of algebraic expressions is desired. The graph will be used frequently, as it is the simplest means of correlating mathematical and physical sciences.

In the second year, five periods per week are devoted to Plane Geometry. The usual theorems and constructions of Elementary Plane Geometry are required. Also the solution of many problems and exercises. Special emphasis is placed upon accuracy and neatness in all written work.

During the third year, five periods per week, for the first two terms, are devoted to Plane Trigonometry and Advanced Algebra. Plane Trigonometry includes the general formulae of Elementary Plane Trigonometry, with applications to the solution of plane triangles and the measurement of

heights and distances. Also the theory of logarithms and the use of logarithmic tables. The course in Advanced Algebra includes: Simultaneous quadratic equations, and equations solved like quadratics, fractional indices, fractional and irrational equations, complex quantities, ratio, proportion, variation and series.

While the course in Mathematics is designed primarily for the acquisition of practical knowledge, we must not overlook the fact, that mathematical studies train the student's mind. And that this training means a distinct gain of mental power.

In the near future, we hope to see the course in Mathematics improved and strengthened. This can be done by extending the course another year, thus making a four-year course. We could then devote an extra half year to Elementary Algebra and an equal amount of time to Solid Geometry.

The following is a list of texts used and references available:

1. Texts used—

Advanced Arithmetic—D. E. Smith.
Elementary Algebra—Wentworth.
Elementary Algebra—C. Smith (for Advanced Algebra).
Essentials of Plane Geometry—Wells.
New Plane Trigonometry—Wells.

2. References—

Academic Arithmetic—Wells.
Algebra for Secondary Schools — Wells.
Elementary Algebra—Tanner.
Secondary Algebra — Fisher and Schwatt.
Treatise on Algebra—C. Smith.
Higher Algebra—Hall and Knight.
College Algebra—Wentworth.
Algebra—Chrystal Vol. I. and II.
Plane Geometry—Wentworth.
Elements of Geometry—Venable.



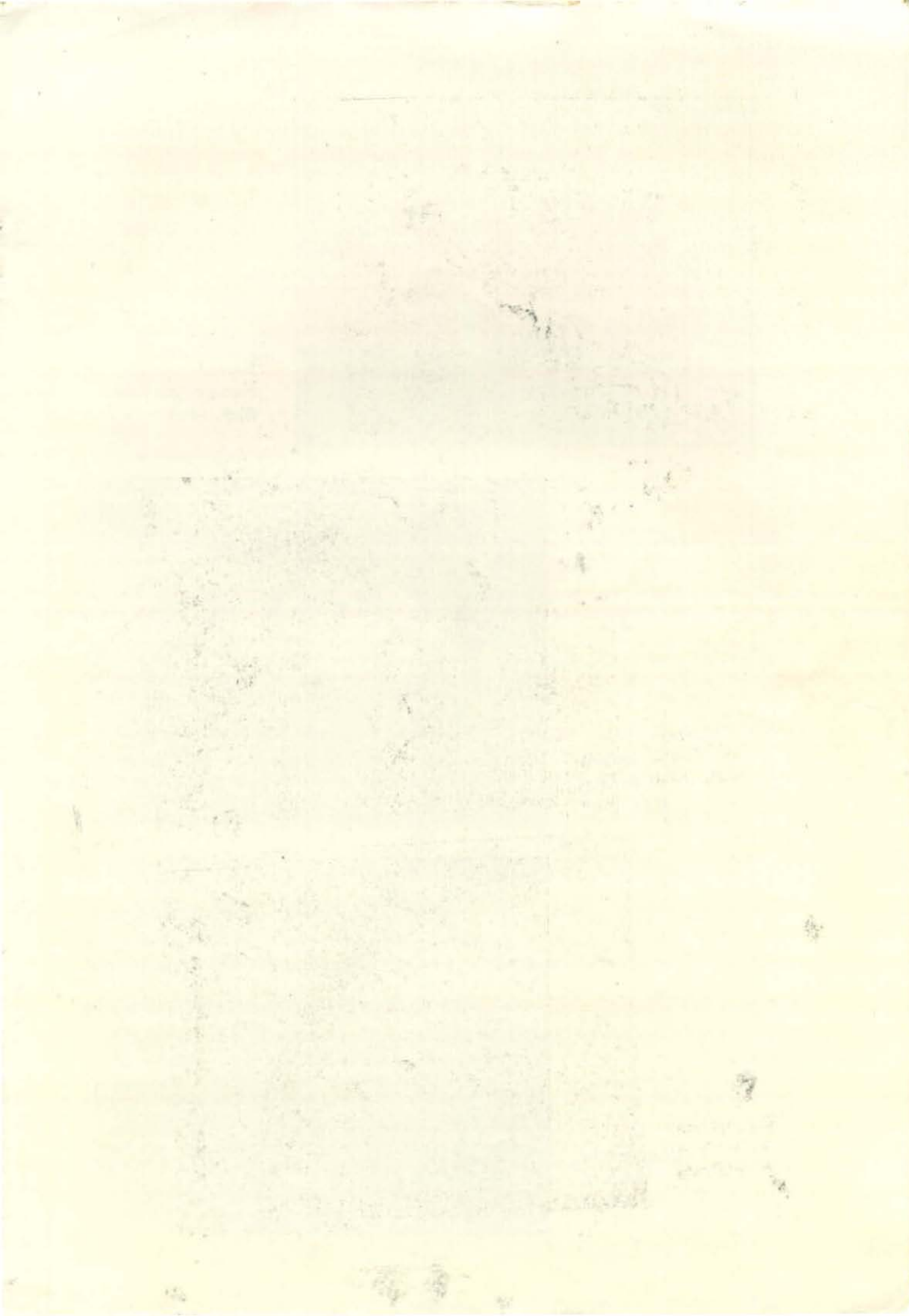
Annual
Farmers Institute
May, 1905



Exhibit
of Sewing
May, 1906



Propagation
Work of
Students



- Plane Geometry—Schultze and Seven-oak.
 Exercises in Geometry—Conant.
 Chauvenet's Geometry.
 Elements of Trigonometry — Phillips and Strong.
 New Plane Trigonometry — Wentworth.
 Plane Trigonometry — Lyman and Goddard.
 A Brief History of Mathematics—Fink.
 Histore of Elementary Mathematics—Cajori.
 A Short Account of the History of Mathematics—W. W. R. Ball.
 American Men of Science—Cattell.
 Mathematics, Recreations and Essays—W. W. R. Ball.
 School Science and Mathematics (monthly.)
 Wm. F. Ewing.

Carpentry

The general lines of instruction as given in the carpenter shop have been toward the construction of buildings and their interior fittings. The preparatory work consists of thirty-one exercises, ranging from the shaping of a rectangular block to the construction of an ornamental newel post. The models, as well as all other work done in the shop, are made from scale drawings, which have been designed with two objects in view: first, to teach the proper use and care of tools; and, second, to give the methods of construction of the various joints as met with in practice. The preparatory work includes a course of lectures on the steel square and its practical application to roof framing; in conjunction with these lectures each student is required to frame and brace a hipped roof of such dimensions as to require a practical knowledge of the square. All students registering in the Mechanics and Agriculture courses are required to take a certain amount of wood work; the Mechan-

ics students devote twelve hours per week, out of a possible forty, for the first year and four hours per week for the second year; the Agricultural student have eight hours per week for one school year. The preparatory exercises for the two courses are practically the same and cover the first twelve weeks of instruction; at the completion of the exercises the student is given practical work along the lines that best suit his course. The Agriculture students have constructed a greater part of the poultry plant equipment, including trap nests, brooders and portable poultry houses. A 40 by 80 foot dairy barn was framed and erected by student labor during the last school year, together with a certain amount of the joinery for the smaller buildings.

A greater part of the school cabinet has been constructed by Mechanics students; a portion of the equipment for the Domestic Science building is now being constructed by first and second year students.
 E. W. Yount.

Forging

In our forging or blacksmith work we are trying to give the boys some practical knowledge of methods and processes of working iron and steel as well as training in the use of tools, and

the observation or correct form and shape. So far our time has been somewhat limited, yet good results have been shown, and the work of the department has proved very beneficial to

those who have taken it. We have two classes of students, those taking the agricultural course who have three months in the shop (two afternoons a week) and those taking the mechanics course, who have one year's work. Some, however, who equip themselves more thoroughly along this special line are given a second year's work in blacksmithing.

Our equipment and mechanical advantages are not yet as complete as some of the larger polytechnic schools enjoy, yet we have many advantages that they do not have. Being on a farm of 280 acres and some little distance from town, the school furnishes its own light, power and water supply, and new problems come up for the boys to solve. There is also the usual repair work such as mending wagon parts, sharpening plow shares, making devices, bolts, wrenches, etc. While students are given a series of exercises in drawing, bending, shouldering, upsetting, welding, etc yet we try as far as possible to make things that will be useful. I have

a large blackboard, placed where it can easily be seen from all parts of the shop, on which the exercises are drawn out large enough to be easily read from a distance.

We also do considerable work from blue prints. The blue print is held by a clamp over the coal box, out of the way of the fire, yet in such a position that it can be easily seen and not disturbed.

The forge shop was built three years ago with the idea of some time enlarging it. We hope soon to have it extended in order that our constantly increasing number of students may be fairly accommodated. The present capacity of the shop should be doubled. We now have eight down-draft Buffalo forges with blast and exhaust run by a five horse-power gas engine. Besides necessary tools the shop is equipped with vices, emery grinder, and drill press. It has tool and supply room, coal room and wash room, with lockers all conveniently placed.

Leo E. Pearson.

Domestic Art

All first-year girls are assigned to work in the department for sixteen periods a week. The second-year girls spend time not otherwise employed in the sewing department.

The course of work consists of thorough drill in fine handwork. The student makes a set of small models, which are placed in a book, together with a written description of the work. After the handwork has been completed the use and care of a machine is taught. Patterns for undergarments are drafted, and the garments are cut and made. The use of a tailor system is taught and each student is required to draft patterns, cut, fit, and make a woolen dress skirt, fitting lining and shirt

waist for herself.

In the third term several weeks are devoted to work in millinery. Students are taught to renovate old hats also to make and cover both wire and buckram frames.

It is not the purpose of the department to train professional dressmakers and milliners, but to give the training that will be useful to any woman no matter what her future may be. At the beginning of the biennial period the equipment in the department consisted of one sewing-machine. We now have five machines, seven large work tables, a cheval glass, dress forms and sufficient funds to thoroughly equip the department in the new building.

Harriet Howell.

Household Arts

Regular class work in Domestic Science in the California Polytechnic School was begun in temporary quarters on September 15, 1905, with a class of thirteen girls. The equipment of the kitchen laboratory consisted of a Majestic range, six work tables, one dozen 24-inch stools, necessary utensils for twelve students, and a case for storing these utensils.

Following the outline of the course of study the students take up cookery in the second year. The work of the second year students is both theoretical and practical. The former consists of lectures, reference reading and a study of the government bulletins bearing upon the composition, production, manufacture and preparation of food materials. The latter covers a course in plain cookery—taking up the cookery of cereals, vegetables, eggs, cheese, fish, meat, breads, plain desserts, etc.

The course for the third year students includes the canning and preservation of fruits and vegetables, the making of pastry, cake, fancy desserts, etc. It also includes a course in invalid cookery. A part of the work of the year is the making out of dietaries. So far each girl has worked out a dietary for a child nine years of age, working from the standards given by Dr. Atwater and by Mrs. Ellen H. Richards. She has also worked out three dietaries

for an imaginary family of six people consisting of four adults and two children. In the first dietary the cost of the food is kept just as low as will provide the necessary amount of nutrients according to the standard. The second is a medium priced menu, and in the third dietary cost is not taken into consideration—or the price set very high.

At present the department is in very crowded quarters, but in a few days we shall move into the commodious building just being finished. The plan is then to actually prepare and serve to invited guests some of the dietaries prepared. The marketing, cooking and serving will be done by the students themselves. As each girl will serve or assist in serving a number of meals she will have opportunity to act both in the capacity of hostess and that of waitress. Each student is also required to give a representative lesson, with the remainder of the class as spectators and critics.

The work in this department also includes a study of house construction, home sanitation and economy, laundering and home nursing.

It has been the hope in planning this course of study that the girl completing it will be able to make a happier, more healthful and more beautiful home than she otherwise would have done.

May Secrest.

The Art Department

While our Art Department may seem quite small when compared with older institutions, rapid strides are being made along this line. Much interest is shown in drawing. We now have twice as much free-hand drawing as last year. Heretofore we have done nothing but pencil drawing, while this year we have

added charcoal, watercolor, pen and ink, and design. Upon the opening of the new Domestic Science building next month we shall be much less crowded, as there will then be additional room and equipment for the Art Department.

Leo E. Pearson.

Mechanical Drawing

The Department of Mechanics at the California Polytechnic Schools aims in a course of three school years to give instruction in Mechanical Drawing to fit the student for work of such a practical nature, that he could in an ordinary emergency design a portion of a machine that may need replacing through a "breakdown" or wear, and do so with promptness and a knowledge of the strength of materials needed. It is possible to say that the course should prepare him for the work of the professional draughting room.

The initial year is necessarily one of a more or less elementary nature in order that real ability to use drawing instruments with accuracy may be acquired. This instruction consists first in the making of varieties of letters for titles and general printing on designs. Following this is given work in Geometrical Construction and thirdly a study of Projection and an insight into Descriptive Geometry.

The course of the second year teaches the student the nature of free hand sketching of parts for design and drawings of such a nature are required that

a symmetry and proportionality between the sketch and the original shall exist. Along with this work is the understanding of sectioning and of what is known as "cross hatching." The next step aims to acquaint the person under instruction with a knowledge of standards—those of general use in the United States—and to familiarize him with the making of standard parts of machines and the design of boiler plates from previously established constants, such as may be obtained from engineers' hand books. The drawing of details is accompanied by a study of intersections.

The last year's instruction in this subject is of a practical application of the previous two years' work. Constants as found from the practice of engineering and from the experimental data of the professional engineer are made use of and the application of the strength of materials to machine construction is emphasized. The course at this stage is of such a nature that original designing of the simpler machines for given stresses and strains is possible.

Crosby M. Gassaway.

The Library

The library contains 763 volumes, classified as follows:

Agriculture	27
Animal Husbandry	216
Including 15 vols. American Aberdeen-Angus, 15 vols. Ayrshire, 14 vols. American Galloway, 16 vols. Guernsey, 60 vols. American Jersey, 28 vols. American Hereford, and 24 vols. American Shorthorn herd books.	
Bacteriology	13
Chemistry	45
Domestic Art and Science	26
Engineering	10

English	88
Entomology	4
History and Civics	39
Mathematics	9
Mechanics	43
Physics and Electricity	30
Physical Science	13
Plant Industry	70
Poultry Culture	13
Reference, general	41
Miscellaneous	6
Magazines, bound	27
Department of Agriculture	43

Total number to June 30, 1906...763

Class in
Gardening-
Irrigating



Percheron Mare
Dolores and
Three Daughters
San Luis Obispo
County Court House
In Back Ground



Horticulture
Making
Grape Cuttings

Fourteen weekly, 10 monthly, and one semi-monthly magazines are being received regularly.

U. S. Department of Agriculture bulletins and reports and Experiment Station bulletins and reports are being received.

Since the report of the librarian was submitted, July 1, 1906, nearly two hundred valuable volumes have been added to the library. These books cover a wide range, including practical works on agriculture, dairying, breeds of animals, chemistry, electricity and electrical machinery, steam machinery, botany, horticulture, landscape gardening, entomology, political economy, American history and government, English literature, cookery and domestic art.

Naomi M. Lake.

Bookkeeping

The object of the bookkeeping course is to give the student a general knowledge of accounts and the use and value of commercial papers in order that he may understand the methods of the business world, whether of the shop, the farm, or the home. The budget system is used and the student moves in a little business world of his own while doing this work. The course as given requires four periods per week for one year.

Last year bookkeeping was included in the regular work of the first-year mechanical course, the second-year mechanical and agricultural courses, and the second-year domestic science course. The use of the journal, ledger, cash book and check book, how to write and issue business papers—in general, all of the principles involved in commercial pursuits were given.

Naomi M. Lake.

School Happenings

The Polytechnic school boys that went to Pacific Grove to the College Y. M. C. A. conference during the holiday vacation brought back the impression that they had a fine time.

Several of them have told in the morning assembly of their impressions of the conference and Pacific Grove. They are unanimous in that they had the time of their lives.

A try-out to select the Polytechnic debating team for the Polytechnic-Santa Maria debate on February 15, was held in the assembly hall on the morning of January 25, with the result that Messrs. Campbell, Emmert and Thaler with La Rue Watson as alternate were selected to represent the us.

January 16 Mr. Smith, of our faculty, gave us a very interesting lecture, illustrated with lantern slides on the work of the Y. M. C. A. in foreign lands.

The lecture was most interesting and showed very convincingly that the Y. M. C. A. is doing a great and good work.

On Friday evening, January 26, the Polytechnic students enjoyed a hard time party in the assembly hall of the school. The evening was most enjoyably spent and the costumes were many and varied. The prizes for the best makeups were awarded to Miss Jeane Tout and Mr. Frank Walbridge. Refreshments of crackers and water were served during the evening. Everyone had a most excellent time and most cordial thanks are due to Mr. Harry Hall and his able assistant, Miss Ella Tanner, to whose untiring efforts much of the success of the evening was due.

The Polytechnic Journal

EDITORIAL STAFF

E. EARL CAMPBELL	Editor-in-Chief
MISS JEANNE A. TOUT	Associate Editors
MR. EIZO KONDO	
MISS FLORENCE MUSCIO	Social
MISS FRANCES LEWIN	Exchange
MR. FRANCIS BUCK	Athletic Editor
MR. HARVEY HALL	Josh Editor
LEROY B. SMITH	Faculty Advisory Editor
MR. ROY LUCHESSA	Business Manager
MR. LA RUE WATSON	Asst. Business Manager

TERMS

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Advertising terms on application to Business Manager.	

Editorials

There was no issue of the Journal for January owing to the lack of time after school opened to get the material necessary to issue.

This issue of the Journal is given over principally to the instructors in our school, who tell of the work of their respective departments. In doing this we believe we may give many young people an idea of our school who would not otherwise hear of it.

Our athletic department has been omitted this issue. The condition of the weather has been such that we have not been able to do much in the way of basketball and baseball, but we have a large number of students who will take part in these sports as soon as practice is begun. And we are sure that the Polytechnic will make a creditable showing.

The idea of self-government has been brought up at the Polytechnic. Other schools have tried it and found it a success. Why can't Polytechnic do the

same thing? It is no longer an experiment. It has been tried and proven. Let us be in the front rank with other schools in the Golden State.

Let every member of the Polytechnic school be at Santa Maria on the night of the Polytechnic-Santa Maria debate. Show the team that you have some school spirit. It will help them to win.

Appropriations for the Polytechnic School

The following bills making appropriations for the Polytechnic School were introduced in the state legislature on Monday, January 14, 1907, by Senator Henry W. Lynch and Assemblyman Warren M. John.

For the purchase of land and a water supply, fifteen thousand dollars (\$15,000).

For the construction and furnishings of shops, twenty-five thousand dollars (\$25,000).

For the construction and furnishing of a dormitory, fifty thousand dollars (\$50,000).

For the completion and furnishing of barn sixteen thousand dollars (\$16,000).

For the construction of two cottages for the use of employes, five thousand dollars (\$5,000).

For the construction and furnishing of a creamery building, twelve thousand dollars (\$12,000).

For the construction of swine, feed, store and work rooms, four thousand dollars (\$4,000).

For the construction of tool and work house for the gardener, two thousand dollars (\$2,000).

For the construction of poultry houses, four thousand dollars (\$4,000).

EXCHANGES

As there was no issue of our journal published last month we wish to thank our exchanges for journals received last month and month before.

Whittier Boys' and Girls' Magazine, we looked over your pages and could find nothing to criticize, every feature is up to the standard, your cuts are good, the workmanship is fine and your paper is of excellent quality. We will be glad to receive you often. "A Thanksgiving" (by Minnie McArthur Lanne) in your November number is fine.

The School Bell Echoes coming from Merrill, Miss., is a new exchange. We have read your journal over carefully and appreciate the work done on it. It is an excellent paper. We hope to see your exchange column grow.

The Thanksgiving number of The Cardinal is a splendid journal. The December number is every bit as good and we always appreciate a new cover. Your advertisers' contest is a very original and a fine idea. We would suggest a few more cuts among your reading matter.

We see the Pedestal among our list. All of your headings are excellent. Come again.

We find some real good stories in The Stoyoman. "A Dream of the Future," written for the reception tendered the Seniors of '06 by the Juniors is worthy of mention.

We like to see a heading like this "Will Arouse Class Patriotism." Your plan to organize two basketball teams to play for a cup is a splendid scheme.

We are always glad to receive The Porcupine. Your cover for December is very suggestive of Christmas. We also found some fine Josh Heads. You have a most excellent exchange column.

The Quill evidently believes in qual-

ity rather than quantity. We would be glad to see your journal so enlarged as to admit of an exchange column, but enjoy it as it is.

The Polytechnic from Pasadena found its way to us again. We are glad to see you again, as you always have something interesting to read.

The Oak always finds welcome. You have a number of good stories. Your "Alphabetical Poem" is fine and "A Hallowe'en Frolic" is very well written.

We are glad to see Debating Notes as a heading in The Sibyl. We hope to see you again.

The Tyro has some excellent reading matter, also some fine headings and your material is good. We are glad you have a different cover. It will protect your journal better. We received the Christmas number in excellent condition.

The Oshkoadah, like the Quill believes in quality more than quantity. We enjoy your journal and wish you also to grow.

The Nugget is always welcome.

Purple and White, your journal does honor to you. We enjoy reading it very much. Hope to see you often on our library table.

Flushing High School Folio, the quality of your paper does not do justice to the quality of your material.

The Pulse, The Far Darter, The Sea Urchin, and The Ariel are new journals, which have found their way to us. We have read and enjoyed you all and will be very pleased to receive you as often as you are published.

The High School Review, The Cornell Countryman and The Janus are old friends. We always enjoy your journals.

JOSHES

Mr. R. (Looking around for pen)—
“Has anyone seen my pen around here?”

Student—“I know where your pen is.”

Mr. R.—“Where?”

Student—“Behind your ear.”

* * *

Students (Discussing class pins)

First student—“Where is your class pin?”

E. Campbell (Blushingly)—“I-I-I don't know. I-I have not my pin with me.”

* * *

Day of Menturn's departure—Grace—
“Gee, my face is getting warm. I must have a fever today.”

* * *

“Why does Clara Stringfield want to read Ramona?”

“Ask Stebbins.”

* * *

“Silently one by one from the dormitory they tread,

For some are found to be troubling the poor Proctor's head.”

* * *

“Mystery of dormitory bath room or what became of the hot water?”

“Ask the Canyon boys.”

* * *

Stebbins in the power house—“I will have to get a higher ammeter to measure this voltage.”

* * *

8:00 p. m., Jan. 24, 1907. Clara studying chemistry alone. Bang! goes the book on the table. The Minstral band is playing—“Ge! I wish I had a steady fellow, I can't sit here and listen to that band.”

* * *

As merry as the day is long.

—Peter K.

Wise and masterly in activity.

—L. C. W.

Love me little love me long.

—E. B. Stebbins.

Look before you leap.

—E. D. P.

* * *

He bought an orange postage stamp,
This up to date young chap,
Then rounded og the corners,
And wore it for a cap.

* * *

A youngster passing the bowling alley, never having seen one before, expressed himself thus:

“Mama, I saw Roy Lawrence down there rolling water melons to beat the dickens, but none of 'em busted.”

* * *

Miss Hyck (In drawing class)—
“Hanby, you are awfully cute.”

Hanby—“Oh! Thank you. I think I can return the compliment.”

* * *

Fine cooking and all kinds of fancy dishes. Apply to Miss Ida B.

* * *

A gentleman one day gave a Portuguese a ride. Upon alighting the Portuguese wishing to express his appreciation, spoke thus:

“Well, much 'bliged.”

“Oh! That's all right, don't mention it,” the gentleman said.

“No, no, I no tol nobody.”

* * *

A tooter who tooted the flute
Tried to tutor two tooters to toot.
Said the two to the tooter, is it harder
to toot or to tutor two tooters to
toot?

* * *

—Ex.

A. C. D. needs to do but one more thing to prove that he is game.

“What is it???”

* * *

A jolly young chemistry tough,
While mixing some confounded stuff,
Dropped a match in the vial and after
a while
They found his front teeth and a cuff.

Our Yellow Peril

By LaRue C. Watson.

We have heard of Yellow Journals;
Yellow perils, great and small;
But there is another yellow
That just fairly makes us crawl.

We don't mind the dry old lectures,
Nor the themes so much, in fact;
But thru all, we see a coming
Something awful, big and black.

We don't mind the recitations,—
They're a cinch compared with what
We all know is going to follow
That will mow us down like shot.

We can answer oral questions,
White long essays by the score,
But grow weak and limp as jelly
When the ex's take the floor.

When that awful yellow paper,
Worst of perils of all shades,
Comes upon the scene, our future
Looms up like the ace of spades.

When in future years the nightmare
Kicks us hardest—hurts us most—

We will see rise up before us,
Frightful, huge—a yellow ghost.

Then we'll waken, joyful feeling!
And will draw a long, deep breath;
Thanking Fortune that we've banished,
To the past, that living death.

Song of The Rain

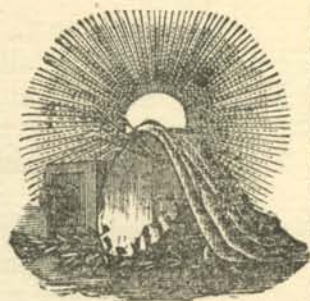
When it rains in Californy,
It makes the tourist mad,
But folks that has the crops to raise
Is feelin' mighty glad.
To stand out in the showers,
Wet as a drown-ded rat,
And watch the grain a-growin',
And the cattle gettin' fat.

Sorry for them Easterners,
Growlin' like Sam Hill,
But the sun-kissed land is thirsty,
And it wanst to drink its fill.
Oh, see the poppies blowin',
And hear the mockers sing,
When it rain in Californy
Through the glory of the spring.
—Ex.



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
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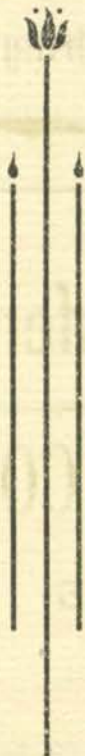
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